Northern Rockies

Weather Watch

NWS Missoula, Montana Spring 2004

Streamflows Forecasted To Be Below Normal While Flash Flooding Potential From Forest Fires Will Be High

Mainstem Rivers and Streams

Snowpack levels across western Montana and north central Idaho were below normal on May 12, 2004. Therefore, forecasts of streamflow levels for the summer of 2004 are expected to be well below normal. See the following snowpack levels for various river basins:

SNOWPACK % OF NORMAL	MONTANA	IDAHO
56	Kootenai	
59	Flathead	
53	Upper Clark Fork	
42	Bitterroot	
44	Lower Clark Fork	
57		Clearwater
30		Salmon

Streamflow forecasts for the April through September period will flow at well below normal levels due to the below normal snowpack (Figure 1). Streamflow levels in the 60 to 82 percent of normal range are expected. The Blackfoot River is expected to flow at 70 percent of normal while Flathead Lake inflows will be about 80 percent of average. In Idaho the Clearwater River is expected to flow at 75 percent of average while the Salmon River is expected to flow at 60 percent of average.

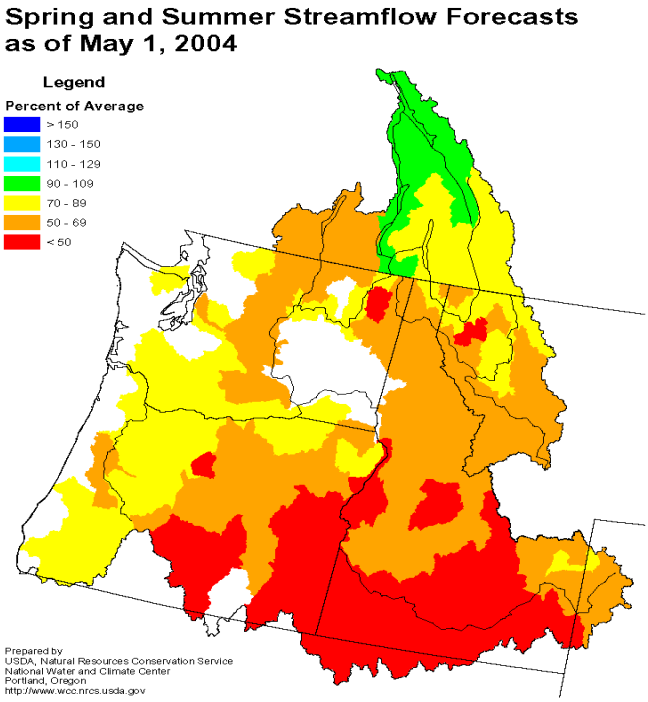

Figure 1

Flash Flooding from Forest Fires of 2003

Some of the areas that were burned by forest fires in the summer of 2003 will be highly susceptible to flash flooding and debris flows in the summer of 2004. The National Weather Service (NWS), in conjunction with the U.S.D.A. Forest Service, have studied the various forest fires that occurred in 2003 and have determined areas that will pose a risk to the public (Figure 2). The NWS has determined high intensity, short duration rainfall events will produce the flash flooding. Rainfall rates typically associated with thunderstorms that produce as little as .30 to .50 inches in less than an hour may trigger debris flows and flash flooding from forest fire areas that have had high burn intensity occur within their watersheds.

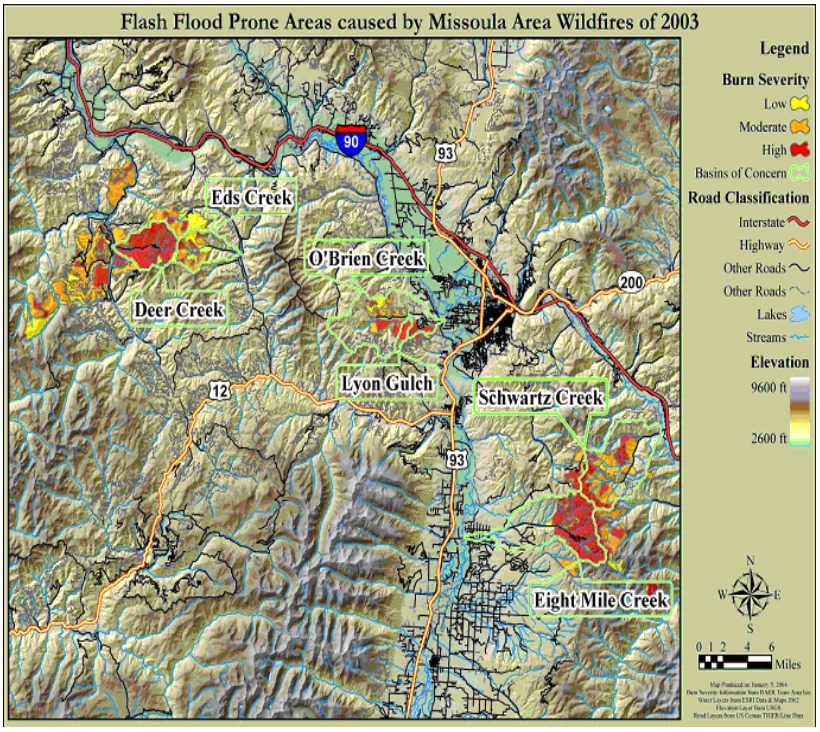

Figure 2

All – Hazard Response – The IMET

The primary mission of the National Weather Service (NWS) is to protect lives and property. Natural disasters such as wildfires threaten lives and property. The Incident Meteorologists (IMET) are forecasters in the NWS who are specially trained to provide weather support at the site of these natural disasters. This support includes natural hazards such as wildfires, chemical spills, flash floods, earthquakes and volcanic eruptions. Wildfire support contributes to over 95% of the IMET's work.

To help suppress large wildfires, National Incident Management Teams (IMT) are sent to manage the operations and support firefighters on the line. If a wildfire becomes complex, the IMT will call for a weather specialist, the IMET. Micro-scale mountain meteorology is one of the specialties in which the IMET is trained.

The IMET's purpose on a wildfire is twofold. First, they provide forecasts for a Fire Behavior Analyst (FBA). The FBA inputs this information into formulas which predict how fast the fire, might move, flame lengths, and what kind of behavior the fire might have.

Secondly, weather changes quickly even on a small scale, and especially in mountainous terrain. Therefore it is important to have a meteorologist on site to monitor and advise the Team about any sudden changes in local weather conditions. These sudden changes in the weather are very critical to the safety of firefighters. Some of this weather cannot be predicted with pinpoint precision from miles away at a forecast office. For example, a sudden shift of the wind, break of the inversion, approaching dry thunderstorms with high winds can all dramatically affect fire behavior and put lives and property in danger.

The IMET obtains his/her information through an advanced communications system called FX-Net. FX-Net is a system composed of a satellite dish and laptop computer. This satellite dish can transmit and receive data. The most important data the IMET receives consists of computerized weather maps and forecast models in an exact replica of what the local NWS office uses. This technology was first used at the 2002 Olympic Games in Salt Lake City, Utah. Data such as up to the minute radar, satellite, local observations, lightning, and computer model data out to 240 hours is used to help the IMET make decisions for the burn area. The IMET will then brief the IMT on the forecasted weather, so the IMT can make decisions on how to fight the fire.

Another means of obtaining data on a fire is by sending up pibal balloons (see picture). Pibal balloons are sent up daily and tracked by an instrument called a theodolite. This process gives a profile of the atmosphere's wind speed and direction above the fire. This is very useful for predicting when an inversion will break and what kind of winds are above the inversion. The time at which an inversion breaks is when fire behavior suddenly increases and can become critical to firefighters.

Lastly, decisions by the IMT on how to fight the fire are many times weather dependent and end up directly or indirectly affecting the cost of fighting the fire. Long range forecasts are given on fires so the IMT can make plans to fight the fire and mitigate costs. ✪

January 2004 Was Full of Weather Extremes!

The winter season of 2003-2004 was fairly tame compared to other more extreme winters seen over the Northern Rockies. The exception was January 2004, which displayed very harsh weather extremes more typical of what we may find in the northern Rockies for the month of January. The following is a summary taken from the National Weather Service's Storm Data publication for both Idaho and western Montana:

In Idaho

Heavy Snow Event, January 3 and 4
An arctic frontal boundary moved from western Montana into north central Idaho and stalled, producing heavy snow for 36 hours. Heavy snow fell at Headquarters which received a storm total of 20 inches. Other storm total snowfall amounts were 15 inches at Pierce, 8.5 inches at Powell Ranger Station, with the mountains receiving up to two feet of new snow.

Heavy Snow Event, January 23 to 25
Warm Pacific moisture pushed into north central Idaho with cold air residing in the valleys, to produce widespread heavy snow for two days. By mid day of January 23, 6 to 8 inches of heavy wet snow had already fallen over the lower valleys, causing power lines to fall with power outages near Kooskia. Heavy snowfall continued the next 24 hours with 16 to 18 inches of new snow reported at Orofino and Kamiah. As the moisture moved eastward into Lemhi County, Salmon received 9 inches of new snow, Shoup 12 inches, and 18 inches reported at Gibbonsville. The Clearwater Mountains received 10 to 20 inches of new snow.

High Wind Event, January 30
A strong west to east oriented jet stream moved over north central Idaho during the morning hours of January 30. Isolated thunderstorms and a strong pressure gradient allowed strong winds aloft to mix to the valley floors, producing damaging winds from Grangeville to Harpster. Wind gusts up to 60 MPH were reported at the Grangeville Airport. The Idaho Free Press Newspaper reported downed trees onto power lines which caused numerous power outages from 630 AM to 1030 AM throughout the area.

In Montana

Winter Storm Event, January 1 to 2
An arctic cold front passed through northwest Montana producing widespread heavy snow and strong gusty northeast winds. Storm total snowfall ranged from 6 to 8 inches with higher amounts in the favored upslope areas, such as 12 to 16 inches from Plains to Elmo; 14 inches at Noxon; 10 inches at Polson, Big Fork and Seeley Lake; and 16 inches at Blacktail Ski Area. Strongest winds occurred the evening of January 1, where Columbia Falls recorded gusts from the northeast at 41MPH, and Kalispell 32 MPH.

Winter Storm Event, January 3 to 4
A reinforcing shot of cold arctic air brought dangerous winter weather conditions to northwest Montana. Arctic air spilled over the Continental Divide during the early morning hours of January 3, with northeast wind gusts between 40 to 50 MPH recorded between Kalispell and Columbia Falls, causing whiteout conditions from blowing snow. Wind Chill temperatures dropped to 25 to 30 degrees below zero, with a wind chill temperature of 52 degrees below zero reported from a weather spotter in Columbia Falls. By 1000 AM, whiteout conditions developed over the Mission Valley south of Flathead Lake, as the arctic front moved southward. Snow drifts of 5 to 7 feet were reported in Columbia Falls and in the Mission Valley. Snowfall totals for the storm were 4 to 8 inches in the valleys, and up to 10 inches in the mountains. Highway 200 between Bonner and Greenough Hill was declared emergency travel only, as well as US-93 in the Mission Valley throughout the day from poor visibility in blowing snow.

Extreme Cold/Wind Chill Event, January 5 to 6
As skies cleared and winds diminished behind a strong arctic cold front, record cold temperatures were experienced across all of western Montana. On both the 5th and 6th of January, minimum temperatures dropped to 20 to 50 degrees below zero. The Polebridge and Libby areas in northwest Montana experienced the coldest readings with minimums of 42 to 50 degrees below zero on both the 5th and 6th. Water pipes in portions of northwest Montana froze and/or broke from

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the extreme cold. Discovery Ski Resort in southwest Montana closed for the day on January 5 due to extreme cold temperatures. Numerous automobiles had to be jump started. Official record lows on the 5th and 6th included: Eureka, 35 below zero on the 5th, and 31 below zero on the 6th; Olney, 34 below zero on the 5th; Polebridge, 45 below zero on the 5th; Hamilton, 28 below zero on the 5th; Anaconda, 27 below zero on the 5th, and 28 below zero on the 6th; Drummond, 36 below zero on the 5th; and Seeley Lake, 40 below zero on the 6th.

Heavy Snow Event, January 25

The combination of warm Pacific moisture clashing with cold arctic air spilling over the Continental Divide produced dangerous winter weather conditions over portions of western Montana. As the cold air spilled over the Continental Divide from late evening of the 24th through the early morning hours of the 25th, temperatures dropped into the single digits with wind gusts from the east up to 30 MPH in the West Glacier Region. Wind chill temperatures also fell to 15 degrees below zero. The 24-hour storm total snowfall in the West Glacier and Blackfoot Regions ranged from 6 inches in the valleys up to 11 inches in the mountains. The Bitterroot and Sapphire Mountains received 8 to 10 inches of new snow. During the day of the 25th, heavy snow fell along the I-90 corridor and Highway 93 near Missoula, causing numerous automobile accidents from icy, slick roads. Near East Missoula, a 10-vehicle accident occurred. Portions of I-90 and Highway 93 were temporarily closed with emergency travel only for several hours during the afternoon, due to poor visibility in heavy snow and very slick roads.

Blizzard Event, January 26 to 27

A strong arctic cold front pushed over the Continental Divide late on January 26 into the 27th, causing blizzard conditions in the West Glacier Region and local whiteout conditions in the northern portions of northwest Montana. In a two-hour period between 200 AM and 400 AM, the temperature dropped 50 degrees at Logan Pass in Glacier National Park, from 16 degrees above zero to 34 degrees below zero. Heavy wind driven snow created zero visibility and forced the closure of U.S. 2 around the southern corner of Glacier National Park over a 50-mile stretch between West Glacier and East Glacier. As the arctic front moved westward, the Department of Transportation advised emergency travel only from Columbia Heights to West Glacier, and near whiteout conditions were reported at the Canadian border at Port of Roosville. Glacier Park personnel were ordered home early due to the poor weather conditions. The 24-hour storm total snowfall ranged from 6 to 8 inches in portions of the Kootenai/Cabinet Region, to 16 to 30 inches in the West Glacier Region. Snow drifts of 3 to 4 feet were reported in the West Glacier Region.

Heavy Snow and Avalanche Event, January 27 to 29

Heavy snowfall continued along and near the Continental Divide as an arctic frontal boundary remained stationary over the area. The 24-hour storm total snowfall reports were 6 inches at Seeley Lake, 15 inches at West Glacier, 16 inches at Marias Pass and 42 inches at Noisy Basin. The arctic frontal boundary that moved through the region on January 26, loaded the area with up to five feet of heavy wet snow by January 28. Wide temperature fluctuations made for an unstable snow pack in the West Glacier Region to produce eight avalanches from Essex to Marias Pass, two of which hit an east bound freight train near Essex. These two avalanches knocked 15 cars off the rails, closing the tracks used by Amtrak's Empire Builder. U.S. 2 was closed for several days as crews tried to clear the snow from the tracks and highway, and avalanche danger continued to be high.

High Wind Event, January 30

A strong west to east oriented jet stream moved into western Montana during the morning hours of January 30. Isolated thunderstorms allowed strong winds aloft to mix down into the Missoula, northern Bitterroot and Upper Clark Fork River Valleys. At the Missoula Airport, wind gusts to 60 MPH occurred at 937 AM. Shortly thereafter, estimated wind gusts of 55 to 60 MPH occurred in the northern Bitterroot Valley and at Gold Creek in Powell County, where downed trees and power lines caused power outages. ✪

Thanks For Your Help!

As the Radar Focal Point at the Missoula, Montana National Weather Service (NWS) Forecast Office, I just wanted to express my thanks for your dedication in the past and for your continued service. Some people may think that with the advent of the Next Generation Radar or NEXRAD that there is no longer a need for spotters or ground truth reports. I can assure you this is far from the truth. Doppler Radar is a very useful tool for weather service personnel to use during significant

weather, but radar has many limitations, especially in mountainous regions such as the Northern Rockies. One limitation associated with radar data in our area is that the radar is placed on top of a mountain, which in our case starts the beam off at approximately 9,000 feet msl. The beam projected then travels upward at an angle of 1/2˚. This means that the information we see is from the middle or upper levels of a storm at farther distances from the radar. That makes it more challenging for forecasters to interpret what is happening in the lower part of a storm where significant elements remain. This is the void where you, the volunteer weather spotter, become vital to the NWS. You do this by providing ground truth data in the form of hail size, wind gusts, rainfall amounts/rates, and by providing any other pertinent information regarding the storm. This in term allows forecasters to issue timely and accurate severe thunderstorm, tornado, winter storm, flood, and high wind warnings in our mission to save lives and property. I again applaud your commitment to aiding us and hope that you understand your importance and significance to the NWS. Without you we could not provide the most accurate and timely weather watches, warnings, and advisories in the entire world. Thank you!

-Patrick Gilchrist
NWS Missoula Radar Focal Point

Inflation Takes a Toll on Rain Gages

In the past we have handed out rain gages to new weather spotters or replaced your broken ones. Unfortunately, we will no longer be able to continue this practice. Like anything else these days, demand for the 4-inch cylinder rain gage has dramatically increased the price. A redesign of the gage by our vendor has also helped push prices up 100% from previous years.

We will continue to pursue other avenues for getting rain gages to you in the future, including lower cost smaller units. In the meantime, we will hand out a few gages at our spotter training sessions when available.

First Totally On-Line Spotter Newsletter!

It took a while, but this is our first spotter newsletter publication made available only on the Internet. To reduce mailing and printing costs, this will be the sole method of receiving the “Weather Watch” from here on out.

We will be sending a post card as a reminder to look on our web site to download future spotter newsletters when they are ready. If you know of someone that does not have Internet access, we will always be glad to mail them a copy or they can call our office to request one. ❂